Developing Software Tools for Better Classroom Management

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Abstract: There are several common problems that teachers of tutorial-style classes face that can be addressed through the introduction of software tools. One of the more troublesome aspects of teaching a new class is quickly learning the names of all the students. Being perceived to have done so has considerable benefits for student outcomes (Cooper, Haney, Krieg, & Brownell, 2017). In classes where active spoken participation is required, it is possible to avoid unintended perceptions of teacher favor or pressure (Babad, 1990) through the use of transparent systematic student selection procedures. This paper will explain the initial stages of development of software designed to improve the efficiency of classroom management, and subsequently student performance. The early form of the software has three main functions: the ability to store student images and present a seating map, the ability to randomize students and groups, and the ability to modify students' grades and attendance records 'on-the-fly' (i.e. during class). The purpose of this paper is to encourage other teachers to explore technological solutions to classroom management problems, and perhaps to elicit volunteers to test the next phase of the application.

Keywords: *Classroom management, Teacher-student interactions, Technology in the classroom*

1. Introduction

A tablet based application is currently being developed by the author with the goal of solving several classroom management problems, and improving student outcomes. The functions of the software are broken down into three parts: use of student images, randomization, and grading and attendance. In combination, these basic functions allow for the implementation of a wide variety of different classroom management strategies. Storing and presenting student photos allows for faster memorization of student names, increased student comfort in group activities, and the disruption of problematic cliques through quick changes in seating arrangements. (Billson, 1986)

The use of randomization in the classroom, when properly explained as an impartial system, allows students to see procedural fairness in classroom interactions, group assignments, and the ordering of serial assessment tasks (i.e. presentations or other tasks that cannot be performed simultaneously). This perception of procedural fairness

greatly affects student evaluation of the teacher (Rodabaugh & Kravitz, Effects of Procedural Fairness on Student Judgments of Professors., 1994), as well as having a positive effect on student motivation and behavior (Christophel, 1990).

Finally, the ability to record students' scores and attendance 'on-the-fly', allows for minimal disruption to learning during administrative tasks. This, in combination with student photos in a seating map, enables teachers to start grading students for participation in class discussions, or other tasks which require students to actively participate in class. Early and regular grading makes it possible for feedback to be given to students individually, which can have a positive effect on student motivation. (Dörnyei, 1994)

2. Photos

Student photos are integral to the application. Because their aim is to allow for quick recognition of students in order to call them by name, or grade them, the photos are

Figure 1. an anonymized example of the student photo view

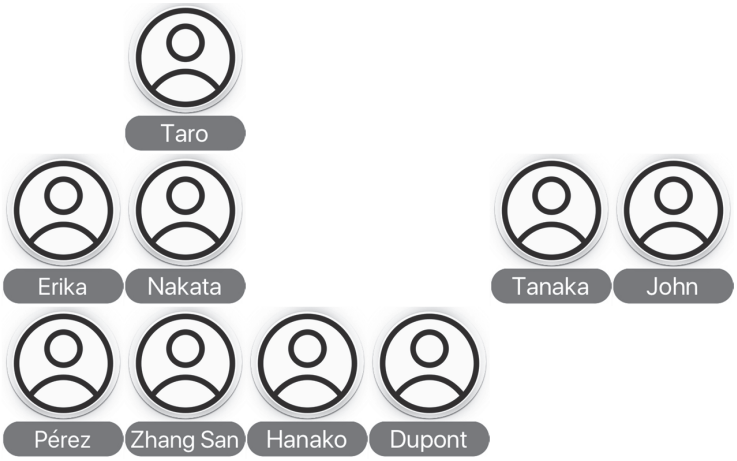

Figure 2. a classroom seating chart view before photos have been taken

focused closely on the face, and presented simply on a grid (see figure 1), with only the student's preferred name written beneath them (see figure 2).

2.1. Benefits

The first benefit of using clear photos of students is the rapid memorization of student names that it affords. As Cooper (2017) states, the use of mnemonic tools (such as name tents) causes students to perceive that their teacher knows their name, even when this is not the case. However, it is this author's experience that regular use of the application rapidly increases the speed with which the teacher actually learns the names of their students. Student's perception that their teacher knows their name leads to increased student trust and effort in class (Glenz, 2014), so this is clearly a desirable outcome.

With early access to the faces and names of all the students in the class, the teacher is able to avoid some of the regular pitfalls in classroom management. The context of student-teacher interactions is very important for student outcomes. The typical pattern of praising enthusiastic students and criticizing problematic students can cause a major, unnecessary discrepancy in student behavior and academic performance (Reinke, Herman, & Newcomer, 2016). Without easy access to student names and faces, however, this pattern is difficult to break out from. Students who perform well will naturally be praised and will generally be remembered by the teacher. Similarly, disruptive or poorly performing students will be chastised and remembered by the teacher. However, those students who are neither particularly engaged, nor difficult to deal with, can find themselves lost in the middle. If, instead, the teacher consciously addresses and appropriately praises all students, the benefits of positive student-teacher interactions can be more fairly distributed.

An ancillary benefit to having access to a seating chart is that it can also be used by students when presenting to the class. It is the author's experience that early on in the semester, when students are still largely unfamiliar with many of the other members of the class, that students presenting are less likely to ask questions of, or field questions from, students whose names they do not know. Providing them with the current seating chart allows them to call on other students by name with a lot more confidence.

2.2. Methodology

Taking student's photos for use in an application is a relatively straightforward endeavor, however there are some steps I would recommend you follow.

1. Explain the reasoning to the class. Students are receptive when the teacher explains that the main purpose of the photos is to remember their names as soon as possible. Showing an example picture on the tablet can demonstrate the small size and nature of the photos, allaying fashion fears and self consciousness.

2. Explain your privacy measures. Explain that you will delete the photo data at the end of the semester (or year, as appropriate), and that all the data is encrypted on the tablet.
3. Give an 'opt-out'. Allow students who feel self-conscious about their appearance to opt-out. Tell them that they're welcome to take a photo in the next class if they'd prefer.
4. Set a task. The photos should ideally be taken in the first class of an academic term, so the photos can be taken during a typical first lesson warm up task. For example, in a writing class photos could be taken whilst the students draft a writing sample. The key point is that the task take sufficiently long (approximately the number of students divided by three minutes), and that a student being momentarily called away will not cause too much disruption to the assigned task.
5. Choose a spot. The place you take the photos should be out of the way, preferably at the back of the classroom. This helps students feel less self conscious. If possible, the area should have bright lighting, and the wall or background for the photos should be simple.
6. Call the students to you one at a time. Be ready with the camera setup in the application before the student arrives. Clearly indicate where to stand, and where to look (some students do not notice the lens on the back of a tablet). Explain that the student may make whichever expression they feel comfortable with. Be sure to frame and crop the photo as closely to the face as possible. Finally, special needs students may need or prefer to be photographed in their seats if they have mobility issues.
7. This can be done quite quickly, and if properly prepared one can expect to take up to three students' photos per minute.

3. Randomization

Randomization in the classroom context essentially means the use of some external tool to shuffle students, groups, or activities. The fact that the source of entropy is external to the students and the teacher is essential to the class' perception of procedural fairness. Using randomization in class is an effective way to avoid unconscious bias on the part of teachers, and the in-built biases of usual ordered methods. Ordering presentations by student number, for example, will usually mean that students in the middle of the student number list consistently have more time to prepare.

3.1. Benefits

As noted above, the major benefit of randomization is its procedural fairness, however there are other significant advantages. Using a randomized class list when asking students questions, or calling for comments is a simple way to make sure all students

are addressed. It has the added benefit of keeping students 'on their toes'. If students know that the teacher is selecting them randomly to answer questions or comment on an issue, then they will need to be ready to respond.

A further advantage is increased classroom efficiency. Having a pre-shuffled list of students to interact with means that the teacher can quickly move between tasks, whilst making sure each student in the class has the chance to engage with the teacher at least once. Random group creation in the application is also very fast, and can be tweaked so that groups, whilst shuffled, are made up of a range of students selected by score (e.g. a high scoring student, two mid-scoring students, and a low scoring student). This can help avoid the learning delays that can befall a group of mostly low scoring students (Kang, 2007).

3.2. Methodology

I would suggest three key situations in which randomization is useful in the classroom.

1. Calling for comment: At the beginning of a lesson, the students can be shuffled at the touch of a button in the application. This shuffled list becomes the queue from which the teacher can draw a student at a time. Each time you require a student to answer a question, read out a passage, or otherwise engage with the class, select the next student in the list. If a student is for some reason unable to engage on their turn, they can be pushed to the end of the list and asked again later. As Japanese students are used to being quiet in English, even in response to direct teacher questioning (Harumi, 2010), using this method is a good way of making sure every student engages with the teacher.
2. Presentations, or some other linear activity: When assessments must be performed one at a time, as in the case of presentations, it is only fair that all students be prepared at the same time. Thus, at the beginning of the task, the student assessment list can be shuffled and presented to the students via projector or some other means. It is important to demonstrate the random nature of the selection process to the students so that they understand its essential fairness.
3. Seating assignments: randomised seating charts can be generated at the beginning of each lesson, or even mid-lesson if a change is required. Shuffling the students' desk-mates can help avoid the forming of unhelpful cliques (Billson, 1986), and deal with problematic pairings. Since everything is handled by the application, the new seating plans can be projected for the class to see, making rearrangements quick and easy to perform without teacher instruction.

4. Grades and Attendance

Giving participation scores, marking homework as completed, or even taking attendance can be a time consuming and sometimes quite difficult process for a new class. Without some way of remembering which student is which, it can be very difficult to fairly grade students on their early semester in-class performance. However, with the addition of photos and an in-built seating map, this can be done quite easily.

4.1. Benefits

Taking attendance using the seating map is a particularly simple task. Students are seated according to the map that they see on projected screen, and so any student who does not appear can be dragged off the map into the 'absent pile'. Because the application allows users to define their own absence and lateness policies, students' attendance percentage can be calculated automatically by the application.

Similarly, using the combination of location memory and facial recognition, teachers can quickly and easily mark homework as completed as they walk around the class, and give instant grades for discussion or participation-based classes.

4.2. Methodology

The workflow for taking attendance and giving grades in class is quite simple. I usually follow these three steps:

1. Produce seating map before class and place on screen. This can be randomized if necessary, or it can be a previously saved seating map (particularly useful in group project classes).
2. After class begins, quickly compare the seating map and attending students. Drag all absent students to the 'absent pile'. As late students arrive, drag them back to their seat; the app will automatically calculate their lateness and append it to their record. In case of excused lateness or absences, this can of course be modified.
3. During class, tap on a given student from the map to give participation points, add notes about their performance, or make any other changes necessary. Teachers can predefine notes that can be applied to a student for a given lesson (e.g. 'Very active!', 'Needs to focus more on discussion', etc.)

5. Conclusion

This application is still in its early stages. At the moment, I am the only user regularly interacting with it. In future, however, it will be interesting to test how use of the application affects perceptions of fairness in the classroom, teacher competence, and

student comfort. I encourage anyone reading this who is interested in participating in future trials, or in using the application in their classroom to contact me for further details.

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